

In the Specification

Paragraph 17

The Abstract of JP041145367 discloses the process of shot peening an alumina article whereby outstanding toughness and breaking strength is obtained. However, the abstract describes a method to enhance the surface toughness of objects made of alumina sintered from and containing a specified amount of Zirconia, which is a transformation toughening material showing a phase transformation induced, for example, by shot peening. This special material, Zirconia, is a very specialized compound, which changes structure from a tetragonal to a monoclinic structure accompanied by an expansion of volume. This expansion takes place at the surface of the object, which leads to internal stresses. Zirconia is the only known compound that shows this effect. Therefore, the Abstract of JP041145367 does not disclose a method for improving the strength of a ceramic without providing an object comprising Zirconia prior to applying the mechanical force.

Paragraph 19

It is also desired to provide a method for improving the strength of a ceramic by applying the mechanical force, where the object to be strengthened does not comprise Zirconia.

Paragraph 21

In accordance with one aspect of the present invention, a method has been provided for increasing the boundary layer strength of workpieces manufactured of ceramic materials comprising the steps of: providing a workpiece; providing a round contour tool; contacting the workpiece with the tool within a predetermined surface area; producing a plastic deformation on the predefined surface area; and generating internal compressive strain within the workpiece in the vicinity of the predetermined surface area wherein the

temperature of the workpiece is not elevated above room temperature and the workpiece does not comprise Zirconia.

Paragraph 22

In accordance with another aspect of the present invention, a method has been provided for increasing the boundary layer strength of workpieces manufactured of ceramic materials comprising the steps of contacting a workpiece with a tool within a predetermined surface area, wherein the temperature of the workpiece is not elevated above room temperature and the workpiece does not comprise Zirconia.

Paragraph 25

The present invention is based on the unforeseen finding that an increase of the boundary layer strength by mechanical treatment on the surface is possible on brittle, hard materials, without the necessity of elevating the temperature of the brittle, hard material. It was also found to be possible to increase of the boundary layer strength by mechanical treatment on the surface of brittle, hard materials, without the necessity of utilizing Zirconia, a very specialized compound, to comprise the brittle, hard material. It was possible, for instance, to demonstrate that a workpiece made of silicon nitride could be processed by plastic deformation on its surface with application of shot-peening methods in such a way that an increase of the boundary layer strength of 15% could be achieved.